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Energy-resolved atomic scanning probe: Mapping local density of states of many-body systems CHIHCHUN CHIEN, University of California, Merced, DANIEL GRUSS, National Institute of Standards and Technology, MASSIMILIANO DI VENTRA, University of California, San Diego, MICHAEL ZWOLAK, National Institute of Standards and Technology — The density of states (DOS) is an important quantity for determining thermodynamic quantities and transport coefficients of many-body systems. The scanning tunneling microscope (STM) measures the product of DOS and the local weight of wavefunction at the measurement location, which is called the local density of states (LDOS). By connecting a narrow-band, noninteracting lattice as a probe to a lattice loaded with interacting particles, the tunneling current also reveals the LDOS of the interacting system. By tuning the relative energy between the probe and the system, the LDOS can be resolved in the energy domain, a task that would be much more difficult in conventional STM. We propose a heterogeneous lattice structure with confined interactions for realizing the energy-resolved atomic scanning probe (ERASP) using cold-atoms in magnetic or optical potentials. The ERASP is capable of mapping out the LDOS of complex interacting systems such as the Hubbard model and provides local information for inhomogeneous systems. Reference: D. Gruss, C. C. Chien, M. Di Ventra, and M. Zwolak, arXiv: 1610.01903.

Chihchun Chien
University of California, Merced

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